Nematology Circular No. 161
January 1989

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

HOPLOLAIMUS GALEATUS: LANCE NEMATODE ON ST. AUGUSTINE GRASS FROM FLORIDA.

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INTRODUCTION: Lance nematodes are large and robust nematodes which measure approximately 1.5 mm in length when fully grown. They belong to the genus *Hoplolaimus* Daday, 1905, which was described from a single specimen found in Paraguay. This circular discusses the species *Hoplolaimus galeatus* (Cobb, 1913) Thorne, 1935, as a pest of St. Augustine grass in Florida.

St. Augustine grass (*Stenotaphrum secundatum*) is a popular lawn and turf grass because of its tolerance to mechanical injury, shade, and salt in addition to its warm season adaptation and beautiful color. Stylet bearing plant parasitic nematodes are found in all major turf grasses in Florida, and can cause severe and unsightly lawn damage to the distress of homeowners and landscapers alike. The problems caused by lance nematodes, particularly *Hoplolaimus galeatus*, have been difficult to manage. *Hoplolaimus galeatus* is widely distributed and chemical treatments have often failed to control these nematodes while controlling other plant parasitic nematodes in the same area of application. The continuing concern for public safety over groundwater contamination by agricultural chemicals and the hazards associated with the use of toxic chemicals in an urban environment have added to the problem.

Hoplolaimus galeatus is widely distributed in the Atlantic coast states from New England to Florida, and in the Mississippi River basin from the Gulf of Mexico to Wisconsin and Minnesota. It has also been found in Colorado and southern California. Outside the United States, it has been reported from Canada, Sumatra, Central and South America, India, and Tanzania.

This nematode has a wide host range and is known to be damaging to cotton, pine, oak, wheat, corn, and other lawn grasses. It also parasitizes beans, bananas, peas, cabbages, sweet potatoes, peanuts, chrysanthemums, sycamore, apple, clover, and alfalfa.

Of the plant parasitic nematodes recognized as important pests of turf grasses in Florida, the lance nematode is considered second only to the sting nematode as a major pathogen of turf grasses. Frequently associated with St. Augustine grass in the sandy soils of the southeast coastal plain, it is very common, feeds on many different hosts, and may be more widespread in turf than the sting nematode, although higher populations are required to inflict severe damage (1,3,7).

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SYMPTOMS: Hoplolaimus galeatus was first observed to be associated with unthrifty St. Augustine grass in 1953 (1,3,4). Kelsheimer and Overman investigated unthrifty lawn grass with symptoms which at first suggested insect damage, fungal disease, or fertilizer deficiency (4). Chlorotic spots appeared, increased rapidly in size, and the centers turned brown and died. Chinch bugs could not be found. Although the symptoms appeared during a period of hot weather, watering failed to revive the grass. Applications of insecticides and fungicides failed to ameliorate the symptoms. Neither were the symptoms improved after fertilizer applications of minor elements, although soil tests showed a pH range at which minor elements should have been available for absorption into the roots. Since the symptoms were typical of nutrient deficiency and drought, it was speculated that some condition of the roots was limiting the uptake of nutrients and water. Examination of the roots revealed typical nematode damage. There was a basic overall reduction of the root system. Small feeder roots were almost all absent. Root tips appeared to be dead and there was a proliferation of new roots growing from behind the injured tips. These new roots also usually appeared to be damaged (4). Roots with these kinds of injuries cannot function properly and most surely would have been responsible for the aboveground symptoms mimicking chinch bug, fungi, or nutrient deficiency. A nematode assay revealed the presence of lance nematodes along with sting, ring, burrowing, and stubby root nematodes. In actual field situations, these nematodes are usually found in combination with other turf damaging nematodes. Although greenhouse and microplot tests have demonstrated the pathogenicity of H. galeatus to St. Augustine grass, it is difficult to assess the actual degree of damage caused by this nematode under conditions when other pathogens are present.

Greenhouse and microplot studies on the effects of H. galeatus feeding on seven varieties of St. Augustine grass were initiated by Henn in 1987. Nematode populations increased on all seven varieties and caused reductions in clipping weights (3). The lance nematode usually feeds from the outside of the roots by embedding the anterior end of its body in the root. It may also enter the root completely. The endoparasitic feeding action of the nematode can cause destruction of the root system resulting in dead roots from which the outer layers slough. This is a characteristic symptom of lance nematode injury (3). Nematodes per se may not be the sole causal agent in the death of a plant. In addition to their direct effects, the wounds they cause open the roots to invasion of secondary microorganisms which can cause rot which kills the root. These organisms exist naturally in the soil but cause little harm until the surface of the root has been wounded by the feeding action of the nematode.

CONTROL: Chemical control measures are expensive, often unreliable and of limited value. Therefore, management of turf to minimize the effects of lance nematodes is especially important for the control of this pest. Management practices that minimize lance nematode damage to turf include:

1. Water properly to encourage deep, tough roots. Water deeply and only as often as necessary to prevent water stress to the grass rather than frequent brief (shallow) watering.

2. Fertilize moderately, using balanced fertilizer. Excessive use of nitrogen fertilizer encourages production of weak, succulent roots which support rapid buildup of nematode populations and provide weak anchorage of turf.

3. Mow at recommended height. Turf that is too short does not have enough foliage to produce sufficient food to maintain an adequate root system. St. Augustine grasses should generally be cut no less than 2 1/2 inches tall in full sun and should be cut higher in the shade.

4. Shade causes additional stress on turf. It may be necessary to limit shade by trimming over-hanging trees, or to plant shade-tolerant ground covers rather than turf grass where shade is too dense to permit healthy turf growth.

5. Minimize traffic and other external stresses, especially where shade or other environmental factors already cause some inhibition of turf growth.

6. Nematicides. Chemicals that can be used to control nematodes (and which often provide poor control of lance nematodes), may be applied to residential turf only by professionals. If a nematicide is used, it will only inhibit nematode activity in turf roots for a limited time (usually 2 weeks to 2 months). If the investment is to be worthwhile, it is imperative that all cultural needs of the turf be provided during that period when nematodes are suppressed in order to attain the maximum improvement in turf performance from the treatment.

SURVEY AND DETECTION: Look for unthrifty, yellowing, or dying patches of grass in an otherwise healthy lawn. Take at least 10 cores of soil (totaling about a pint) from different positions around the perimeter of the unthrifty, yellowing, or dying spot, and send it to a nematology laboratory.

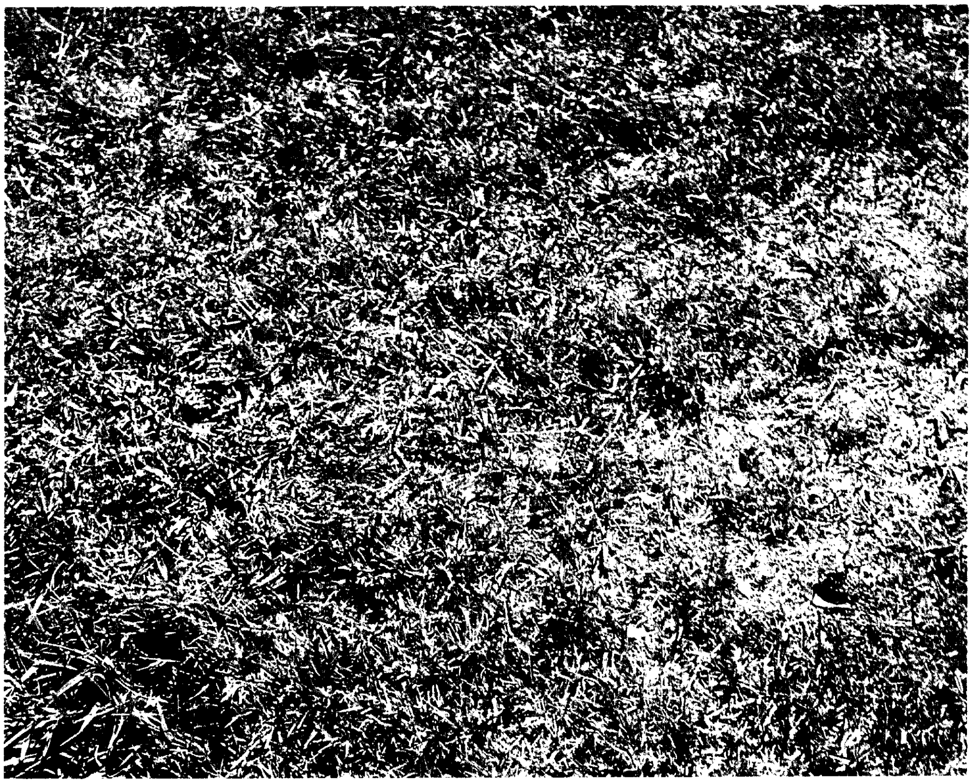

Fig. 1. St. Augustine grass infected with high numbers of lance nematodes.

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Contribution No. 371, Bureau of Nematology

This publication was issued at a cost of $1131.27 or $ 0.25 per copy to provide information on proper recognition of plant pests. PI89T-07